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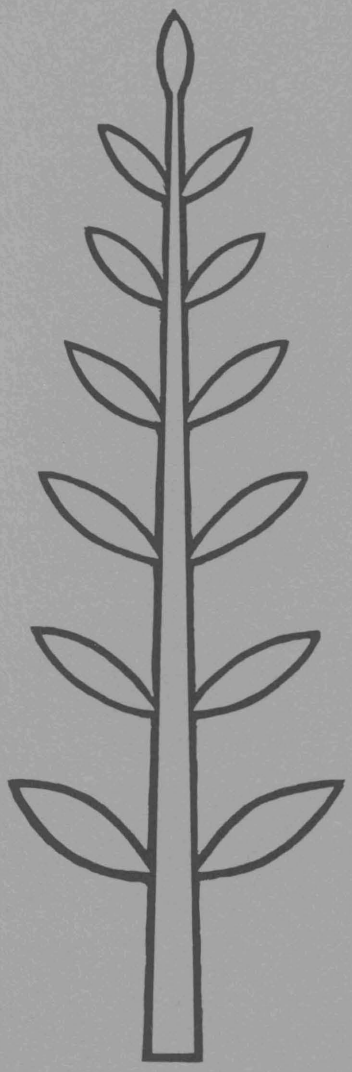
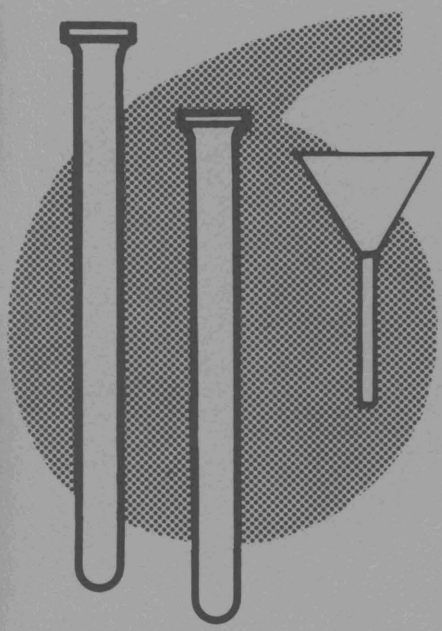


Suggestions for WEED CONTROL WITH CHEMICALS



HORTICULTURAL CROPS

- Vegetables
- Tree Fruits and Nuts
- Small Fruits
- Citrus

THE TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM
DANIEL C. PFANNSTIEL, DIRECTOR
COLLEGE STATION, TEXAS

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SUGGESTIONS FOR WEED CONTROL WITH CHEMCIALS

Rupert D. Palmer*

INTRODUCTION

This publication lists current suggestions for using chemicals to control weeds in horticultural crops. These suggestions are based on the valid information available, primarily results of the most recent research tests by the Texas Agricultural Experiment Station and demonstrations by the Texas Agricultural Extension Service. A new herbicide treatment is added when sufficient research data are available to demonstrate its value. Information in this bulletin appears in abbreviated form. Review product labels for more detail on specific uses. Copies of this publication are available from county Extension agents and the Department of Agricultural Communications, College Station, Texas 77843.

CONTENTS

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HERBICIDE SAFETY

Suggestions for weed control with chemicals are based on control effectiveness. The ultimate responsibility for safe use of herbicides depends on the user. Know and carefully observe laws and regulations relating to chemical use and follow the manufacturer's directions on federally registered labels.

Most herbicides are potentially dangerous, but they probably will not cause injury if used properly observing recommended precautions. Dangers associated with mishandling and misapplying herbicides include possible injury to the operator and handler; poisoning of livestock, fish and wildlife; and damage to the equipment and desirable plants.

Read the label on each container before using the contents. Understand and follow label instructions. Avoid contact with skin. Do not breathe vapors or dusts or splash herbicide mixtures into your eyes or mouth.

Wash off any herbicide spilled on the body. Wash exposed area of the body as frequently as possible. Never smoke or eat while working with chemicals. If the label calls for more rigid specifications, follow them. If symptoms such as dizziness, nausea or skin rashes appear, seek medical attention immediately. Tell the physician what you were using when the symptoms appeared.

Protect desirable plants from accidental herbicide treatments. Accidental damage often is caused by drift from nearby applications or surface runoff on plants with herbicides leaching into the root zone. Contact your county Extension agent about state regulations for spraying 2,4-D, MCPA, silvex, dicamba and similar hormone-type herbicides or any herbicide if you have doubts about its proper use.

Clean equipment immediately after applying herbicides to prevent corrosion of metal parts; damage to rubber and plastic parts; caking in lines, tanks and nozzles; or other forms of damage.

Fish and wildlife may be poisoned by excessive herbicide applications or water contamination. Certain herbicides control aquatic weeds but some are highly toxic to fish. If there is concern about a proposed spraying program endangering fish or wildlife, consult your local agent or the federal or state Fish and Wildlife Service.

Effective use of herbicides in crops depends on: (1) identification of the weed or weeds to be controlled, (2) selection of an approved herbicide effective on such weeds, (3) its safety in relation to possible damage to small grains and other plants, (4) application at the proper rate, time and method and (5) observing label precautions.

SMALL AREA FORMULAS

Formulas and Examples for Calculating Amounts of Herbicides to Mix for Small Areas

Herbicide rates in this bulletin are listed as the amount of product per acre. Large package products list rates on an acre basis, but available small package products may list rates on smaller areas. To convert from an acre to 1,000 square feet, use the following formulas.

FORMULA: $$\frac{\text{acre rate (lb. or pt. x oz.)}}{43.560\ (43{,}560 \text{ sq. ft.} \div 1{,}000 \text{ sq. ft.})} = \text{rate per 1,000 sq. ft.}$$

Example 1: The rate per 1,000 sq. ft. when 1 qt. of product is applied per acre is calculated by:

$$\frac{1 \text{ qt. x } 32 \text{ fl. oz. per qt.}}{43.560} = 0.73 \text{ fl. oz. per 1,000 sq. ft.}$$

Example 2: The rate per 1,000 sq. ft. when 2.5 lbs. of Princep 80W is applied per acre is calculated by:

$$\frac{2.5 \text{ lbs. x } 16 \text{ oz. per lb.}}{43.560} = 0.92 \text{ oz. per 1,000 sq. ft.}$$

The spray volume is also listed at a broadcast rate per acre in this publication. To convert the acre volume to fluid ounces per 1,000 sq. ft., use the following formula.

FORMULA: $$\frac{\text{Spray vol. in gal./acre broadcast x 128 fl. oz./gal.}}{43.560} = \text{fl. oz./1,000 sq. ft.}$$

Example: The rate per 1,000 sq. ft. for a volume per acre broadcast of 40 gal. is calculated by:

$$\frac{40 \text{ x } 128}{43.560} = 117.5 \text{ fl. oz. per 1,000 sq. ft. or 3.66 qts.}$$

For small areas, use the higher spray volume per acre broadcast because of the ease of spraying.

Example: If a range of 10 to 40 gal. per acre is listed, select the 40-gal.-per-acre rate.

Sprayers for Small Areas

Use water first to check the calibration of a compressed air hand sprayer. From the example for calculating spray volume above, measure 117.5 fl. oz. water into the sprayer, pump up pressure to maintain full angle performance of the nozzle, 25 to 30 psi. Practice spraying an area of 1,000 sq. ft. to deliver the 117.5 fl. oz. uniformly. Refill the sprayer with the 117.5 fl. oz. containing the 0.73 fl. oz. of herbicide product determined in example 1. Repeat the spraying procedure to the area to be treated.

EQUIVALENTS

Liquid

Liquid 1 gal. = 4 qt. = 128 oz.
1 qt. = 2 pt. = 32 oz.
1 pt. = 2 cups = 16 oz.
1 tbsp. = 3 tsp.
2 tbsp. = 1 oz. = 29.5 ml.
16 tbsp. = 1 cup = 8 oz.
1 oz. = 29.5 ml. or cc.

Dry

1 lb. = 16 oz. = 454 grm.
1 oz. = 28.35 grm

EQUIPMENT CALIBRATION

Granular Distributors

Use a distributor to apply granular herbicide uniformly over an area instead of in close-spaced rows. Use granular spreaders with distributors, which scatter the granulars uniformly over the soil surface.

Example: You are going to apply 180 pounds of Dacthal G-5 per acre. You plan to use a 10 feet wide granular spreader and run at 3 miles per hour (mph) over a 100-feet course (1,000 square feet in the calibration). Determine how many ounces the spreader should deliver to give the desired rate.

FORMULA: $\frac{\text{lb./A. of product x oz./lb.}}{43.560}$ = oz./1,000 sq. ft.

Calibration: $\frac{180 \text{ lb. x } 16 \text{ oz.}}{43.560}$ = 66.1 oz. needed per 1,000 sq. ft.

The product label may include the spreader settings for the type of spreader you use. Try this setting and run the spreader over the 100-foot course while collecting the herbicide with a trap or plastic bag attached to the spreader. Weigh the herbicide and if necessary, adjust the spreader until it is calibrated.

Sprayers

Speed, pressure and nozzle size are involved in sprayer calibration. Numerous calibration methods may be used, but the following formulas are suggested as an accurate and relatively fast procedure. A measuring tape, watch and a 1 quart and 1 pint container are needed. If you know the speed (mph) you wish to travel, the gallons per acre (gpa) of spray solution desired and the nozzle spacing (w) on your boom, substitute these values into the formula below. A formula to determine proper pump capacity is also shown. The example illustrates how to use the formulas.

FORMULAS:

1. $$\text{mph} = \frac{204}{\text{seconds to travel 300 ft.}}$$ (Measure a 300-foot course and record the seconds required to travel it at the desired speed.)

2. $$\text{gpm per nozzle} = \frac{\text{gpa}^{*} \times \text{mph} \times \text{w}^{*}}{5{,}940}$$

gpa = gallons per acre on the area actually treated. Example: 20 gallons water per acre.

w = nozzle spacing in boom spraying, spray swath in broadcast boomless spraying, measured in inches.

3. $$\text{Seconds per quart per nozzle} = \frac{15}{\text{gpm per nozzle}}$$

4. pc = (3 gpm/50 gallons mixture) + (gpm/nozzle x number of nozzles)

Example: Spray 1.75 pounds of a herbicide product in 20 gallons of water per acre at 4 mph with nozzles spaced 20 inches apart on a boom. If the herbicide rate is given for 1,000 square feet, multiply by 43,560 to determine the rate per acre.

Calculation: (See formulas 1 through 4 above.)

1. $$4 \text{ mph} = \frac{204}{\text{seconds to travel 300 ft.}}$$ or $204 \div 4 = 51$ sec./300 ft.

Run equipment over a 300-ft. course in 51 seconds at 4 mph.

2. $$\frac{20 \text{ (gpa)} \times 4 \text{ (mph)} \times 20 \text{ (nozzle spacing)}}{5{,}490} = 0.27 \text{ gal./min./nozzle}$$

Use 9503, or FS7 flat spray nozzle or appropriate cone nozzle at 30 pounds per square inch (psi). The nozzles in each end of the boom should be half the size of the other nozzles. The smaller nozzle will allow overlap on the throughs.

3. $$\frac{15}{0.27 \text{ gpm per nozzle}} = 55.6 \text{ sec./qt./nozzle,}$$ or per 1 pt. for the one-half size end nozzles.

One quart, except 1 pint for the nozzles in the end of the boom, should be delivered from each nozzle in 56 seconds. This quantity should be delivered with the pressure regulator set at 30 psi; however, minor adjustments may be necessary. If two engines are on the equipment, the engine running the sprayer pump should allow 1 quart to be collected from one nozzle in 56 seconds when the pressure regulator is adjusted to about 30 psi. If one engine runs the pump and the machine, adjust the pressure regulator to collect 1 quart in 56 seconds and the throttle setting to travel 4 mph. The machine may be set out of gear for this check, but with the pump running.

The pump should have capacity to supply the requirements of each nozzle plus 3 gallons per minute for hydraulic agitation for each 50 gallons of mixture. Agitation of suspended wettable powders and oil-water emulsions is necessary.

Example: Agitate and spray from a tank with 100-gallon capacity (100 ÷ 50 gal. = 2) using a sprayer with 10 nozzles, each spraying 0.27 gpm.

4. Calculation: PC = (3 gpm x 2) + (0.27 x 10); PC = 8.7 gpm.

WEEDS

The 16 problem weeds presented in this publication are:

1. Cool Season Weeds - germinate in the fall and winter, mature and produce seed in early spring or summer normally before July and then die.

   (a) Native annual - see figures 1, 2, 3, 8, 9 and 10.

2. Warm Season Weeds - germinate in early spring and summer, mature and produce seed in the summer and die. Creeping perennials regrow for more than 2 years from vegetative structure - rhizomes.

   (a) Native annuals - see figures 4, 5, 11, 13, 15 and 16.
   (b) Introduced annuals - See figure 14.
   (c) Native perennials - see figures 6, 7 and 12.

Line drawings of weeds were taken from The World's Worst Weeds, Holm, LeRoy, 1977; Weeds of Wyoming, Bulletin No. 498, June 1969; and Selected Weeds of the United States, Agricultural Handbook, No. 366, USDA, 1970.

The weeds listed in table 1 were on labels of the herbicides used in this publication. If the control of a specific weed in a crop is needed, refer to table 1 for the weed and select the chemical and time of application for the crop. Refer to the contents for the crop table.

Eastern and western areas of Texas, as referred to in the tables, are divided by a point where rainfall per year averages at least 20 to 25 inches.

Figure 1. Wild oat. *Avena fatua* L. Gramineae. A, Habit - x 0.5; B, spikelet - x 2; C, florets, 3 views - x 3.5.

Figure 2. Japanese brome. *Bromus japonicus* Thumb. Gramineae. A, Habit - x 0.5; B, spikelet - x 3; C, ligule - x 2; D, floret - x 5; E, caryopsis - x 5.

Figure 3. Cheat, Chess. *Bromus secalinus* L. Gramineae. A, Habit - x 0.5; B, spikelet - x 2.5; C, ligule - x 1.5; D, floret, 3 views - x 3; E, caryopsis - x 3.

Figure 4. Junglerice. *Echnoichloa colonum.* Gramineae. A, culm, leaf sheath and ciliate leaf base - x 3; B, spikelet - x 12; C, floret, adaxial view, showing indurated pales - x 12; D, floret, abaxial view, showing indurated lemma - x 12; E, Habit, showing decumbent stems rooting at the nodes - x ¼.

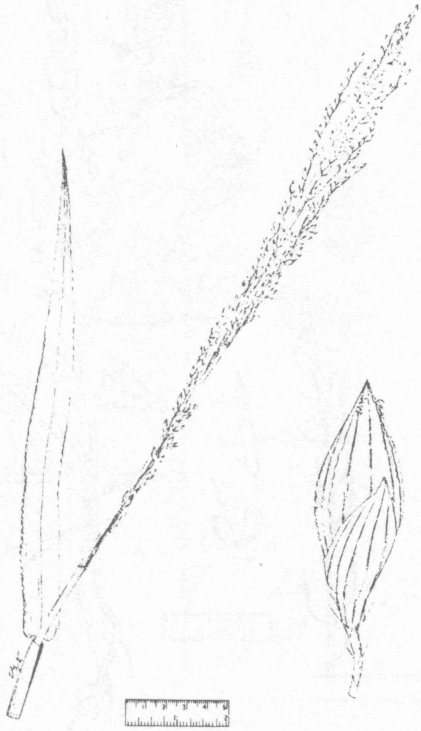

Figure 5. Texas panicum. *Panicum texanum.* Gramineae. Inflorescence and spikelet.

Figure 6. Johnsongrass. *Sorghum halepense* (L.) Pers. Gramineae. A, Habit - x 0.5; B, spikelet - x 4; C, ligule - x 1.5; D, florets - x 5; E, caryopses - x 5.

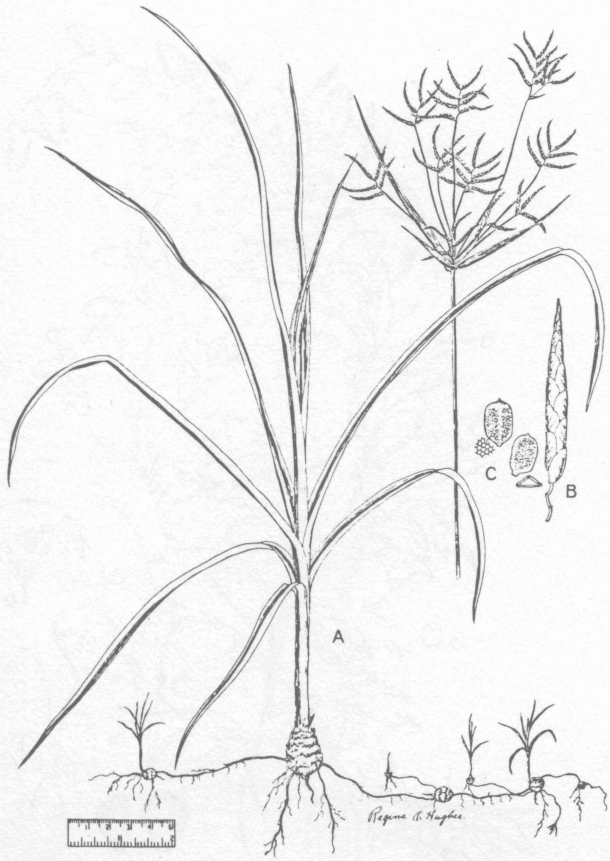

Figure 7. Purple nutsedge. *Cyperus rotundus* L. Cyperaceae. A, Habit - x 0.5; B, flowering spikelet - x 5; C, achenes, showing type of reticulation and cross section in detail - x 10.

Figure 8. Sheperdspurse. *Capsella bursa-pastoris* (L.) Medic. Cruciferae. A, Habit - x 0.5; B, flowers - x 5; C, silicle - x 4; D, seeds - x 10.

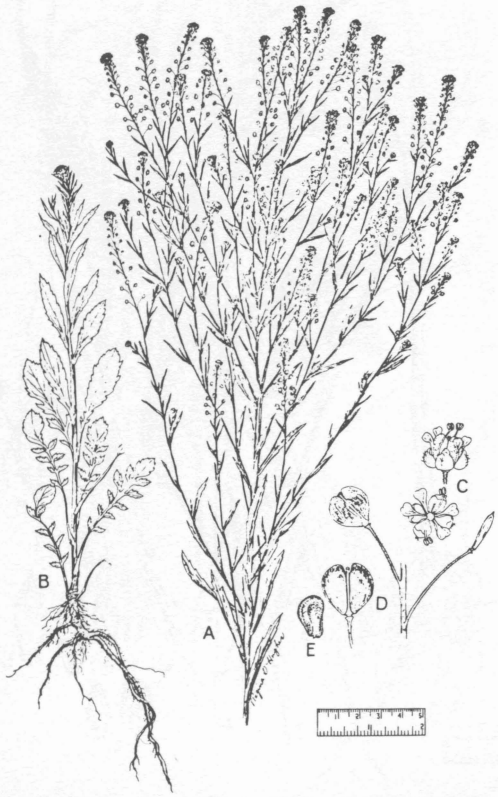

Figure 9. Virginia pepperweed. *Lepidium virginicum* L. Cruciferae. A, Habit, upper part of plant - x 0.5; B, young plant, showing basal and cauline leaf forms - x 0.5; C, flowers - x 7.5; D, silicles, mature and immature - x 3; E, seed - x 10.

Figure 10. Treacle mustard. *Erysimum cheiranthoides* A - D; *Erysimum repandum* L., E. Cruciferae. A, plant; B, upper part of stem showing pods; C, pod; D, seeds.

Figure 11. Ivyleaf morningglory. *Ipomoea hederacea* (L.) Jacq. Convolvulaceae. A, Habit - x 0.5; B, sepals - x 1.5; C, capsule - x 2; D, seeds - x 5.

Figure 12. Field bindweed. *Convolvulus arvensis* L. Convolvulaceae. A, Habit - x 0.5; B, rootstock - x 0.5; C, leaf variation - 0.5; D, flower, showing 5 stamens of unequal length - x 1; E, capsule - x 3; F, seeds - x 4.

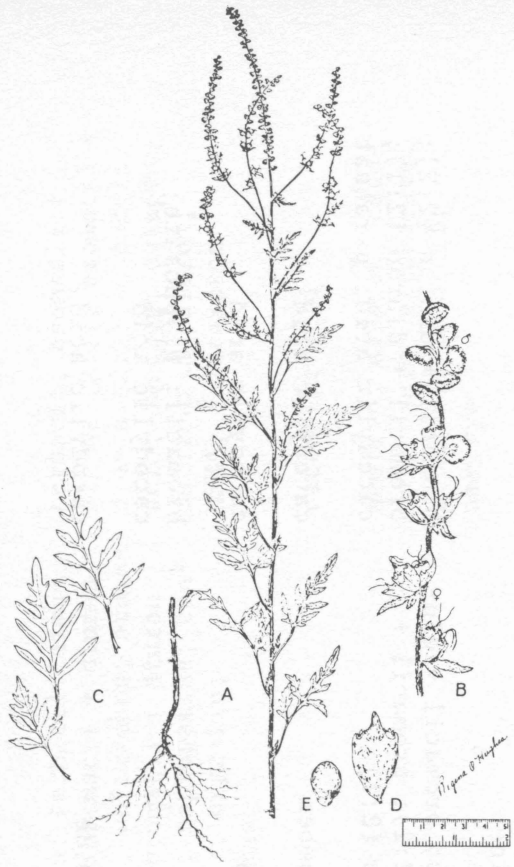

Figure 13. Common ragweed. *Ambiosia artemisiifolia* L. Compositae. A, Habit - 0.5; B, raceme with male heads (above) and female involucres (below) - x 2.5; C, leaf variations - x 0.75; D, achene - x 5; E, seed - x 5.

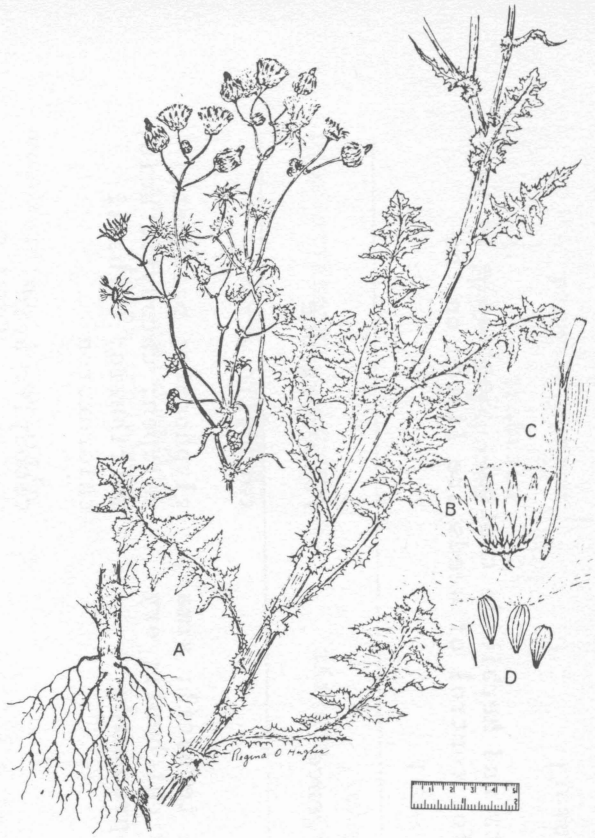

Figure 14. Annual sowthistle. *Sonchus asper* (L.) Hill. Compositae. A, Habit - x 0.5; B, flower head - x 1.5; C, single flower - x 3; D, achenes - x 5.

Figure 15. Palmer pigweed. *Amaranthus palmeri.* Amaranthaceae. A, middle section of plant - x ½; B, top of plant - x ½; C, staminate flower - x 5; D, single anther - x 6; E, pistillate flower - x 5; F, capsule dehiscing - x 5; G, seed - x 5. (V. F.).

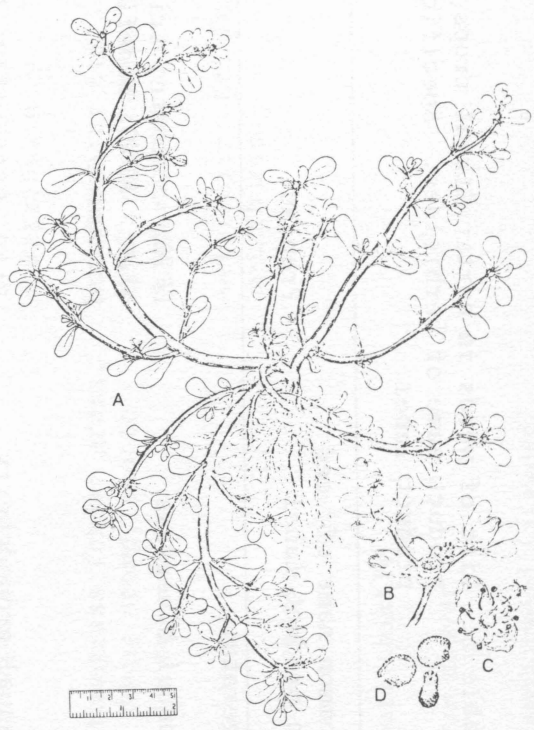

Figure 16. Common purslane. *Portulaca oleracea* L. Portulacaceae. A, Habit - x 0.5; B, flowers and capsules - x 1.5; C, flower open - x 4; D, seeds - x 18.

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label.

Common name of weed on product label	Preplant	Preemergence	Postemergence
ageratum		diuron	cacodylic acid
annual bluegrass	EPTC; cycloate; trifluralin + EPTC; benefin; pronamide	diuron; terbacil; simazine; dichlobenil; oryzalin; pronamide	glyphosate; paraquat; dalapon; cacodylic acid; metribuzin; terbacil; chloroxuron
annual groundcherry		diuron	cacodylic acid
annual lovegrass		diuron	cacodylic acid
annual morningglory	EPTC; pronamide	diuron; simazine; oryzalin; pronamide	cacodylic acid; diuron; paraquat; chloroxuron
annual ryegrass	EPTC; cycloate	diuron; terbacil; simazine	terbacil; cacodylic acid
annual sowthistle		diuron; bromacil + diuron (2:2); bromacil + diuron (2:1)	bromacil + diuron (2:2); bromacil + diuron (2:1); cacodylic acid; paraquat
annual spurge		chloramben	cacodylic acid
annual sweet vernalgrass		diuron	cacodylic acid
bahiagrass			bromacil; glyphosate; cacodylic acid
barley	cycloate, EPTC; pronamide	pronamide	cacodylic acid

barnyardgrass	trifluralin + metribuzin; trifluralin; napropamide; metribuzin; bensulide + naptalam; cycloate; bensulide; EPTC; benefin; pronamide	diuron; terbacil; simazine; bromacil + diuron (2:2); chloramben; bromacil; bromacil + diuron (2:1); napropamide; bensulide; oryzalin; pronamide	terbacil; bromacil + diuron (2:1); bromacil + diuron (2:2); cacodylic acid; ametryn; dalapon; metribuzin; diuron; MSMA; chloroxuron
beggarweed	metribuzin; trifluralin + metribuzin		cacodylic acid
bermudagrass (seedling)	EPTC	terbacil	ametryn; dalapon; cacodylic acid; glyphosate; bromacil; terbacil; ametryn
bindweed	bensulide + naptalam		glyphosate; paraquat, cacodylic acid
black nightshade	cycloate, EPTC	oryzalin; chloramben	cacodylic acid; chloroxuron
bracharia (signalgrass)	trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	terbacil; oryzalin	terbacil; MSMA; cacodylic acid; chloroxuron
bromegrass (cheat grass, downy brome, smooth brome)	trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin		cacodylic acid; glyphosate; paraquat
buffalobur	metribuzin; trifluralin + metribuzin		cacodylic acid
bufflegrass		simazine + ametryn dichlobenil	ametryn; cacodylic acid
bull thistle		dichlobenil	
bur clover			cacodylic acid; paraquat
camphorweed (pigweed)		dichlobenil	cacodylic acid
carelessweed		simazine	cacodylic acid

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
carpetweed	bensulide + naptalam; trifluralin + EPTC; DCPA; trifluralin; napropamide; metribuzin; trifluralin + metribuzin; benefin; pronamide	DCPA, chloramben; simazine, dichlobenil; oryzalin; pronamide	metribuzin; cacodylic acid; chloroxuron
cattails			dalapon; cacodylic acid
cheat	trifluralin; trifluralin + EPTC; pronamide	simazine; pronamide	cacodylic acid
checkweed	EPTC; DCPA; metribuzin; trifluralin + metribuzin; bensulide + naptalam; trifluralin + EPTC; benefin; pronomide	DCPA; chloramben; diuron; terbacil; bromacil; diuron (2:2); simazine; dichlobenil; oryzalin; pronamide	terbacil; bromacil + diuron (2:2); MSMA; cacodylic acid; paraquat; chloroxuron
cinquefoil		terbacil	terbacil; cacodylic acid
cocklebur	metribuzin; trifluralin + metribuzin; bensulide + naptalam		metribuzin; MSMA; cacodylic acid; chloroxuron
coffeeweed	metribuzin; trifluralin + metribuzin	chloramben; dichlobenil	cacodylic acid
corn speedwell		diuron	cacodylic acid
corn spurry	EPTC	diuron	cacodylic acid

crabgrass (large, smooth)	trifluralin; EPTC; bensulide; DCPA; bensulide + naptalam; cycloate; trifluralin + EPTC; napropamide; metribuzin; trifluralin + metribuzin; benefin; pronamide	bensulide; DCPA; chloramben; bromacil; diuron; terbacil; simazine; bromacil + diuron (2:2); bromacil + diuron (2:1); dichlobenil; oryzalin; pronamide	metribuzin; bromacil; dalapon; diuron; terbacil; MSMA; bromacil + diuron (2:2); bromacil + diuron (2:1); cacodylic acid; glyphosate; paraquat; chloroxuron
crotolaria		terbacil	terbacil; cacodylic acid
crowfootgrass	metribuzin; trifluralin + metribuzin; benefin	bromacil; terbacil; oryzalin	bromacil; diuron; terbacil; cacodylic acid
cudweed		dichlobenil	cacodylic acid
curly dock			metribuzin; cacodylic acid; glyphosate
dallisgrass			cacodylic acid; glyphosate
dandelion		dichlobenil	metribuzin; cacodylic acid
dayflower		diuron	metribuzin; cacodylic acid
dogbane (hemp)			cacodylic acid; glyphosate
dogfennel		diuron; terbacil; dichlobenil	terbacil; cacodylic acid
downy brome		terbacil	terbacil; cacodylic acid
eveningprimrose		dichlobenil	cacodylic acid

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
Fall panicum	bensulide + naptalam; trifluralin + EPTC; bensulide; EPTC; trifluralin; napropamide; metribuzin; trifluralin + metribuzin; benefin; pronamide	bensulide; chloramben; simazine; oryzalin; pronamide	cacodylic acid
fescue			cacodylic acid; glyphosate
fiddleneck	trifluralin + EPTC; EPTC	diuron; dichlobenil	paraquat; cacodylic acid
filaree		bromacil + diuron (2:2)	cacodylic acid; paraquat; bromacil + diuron (2:2)
fireweed		terbacil; simazine	terbacil; cacodylic acid
fleabane		bromacil + diuron	cacodylic acid; glyphosate; bromacil + diuron (2:2); paraquat
flixweed	metribuzin; trifluralin + metribuzin		cacodylic acid
Flora's paintbrush		diuron; terbacil; simazine	terbacil; cacodylic acid
Foxtail	trifluralin; trifluralin + EPTC; DCPA; metribuzin; trifluralin + metribuzin; benefin; pronamide	DCPA, diuron; terbacil; bromacil + diuron (2:2); bromacil + diuron (2:1); simazine; dichlobenil; oryzaln; pronamide	metribuzin; terbacil; paraquat; bromacil + diuron (2:2); bromacil + diuron (2:1); glyphosate; dalapon; MSMA; cacodylic acid
fumitory			metribuzin; cacodylic acid

galinsoga	bensulide + naptalam		cacodylic acid
giant foxtail	EPTC; bensulide; bensulide + naptalam; cycloate; trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	bensulide; chloramben; simazine; oryzalin	dalapon; cacodylic acid
goosefoot	trifluralin; trifluralin + EPTC		metribuzin; cacodylic acid
goosegrass	EPTC; bensulide; bensulide + naptalam, trifluraline + EPTC; napropamide; benefin; pronamide	chloramben; simazine; oryzalin; pronamide	diuron; MSMA; cacodylic acid; chloroxuron
green foxtail	EPTC; bensulide; bensulide + naptalam; cycloate; trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	bensulide; chloramben; simazine; oryzalin	dalapon; cacodylic acid
gromwell		diuron	cacodylic acid
groundcherry	bensulide + naptalam		cacodylic acid; paraquat
groundsel		bromacil + diuron (2:2); terbacil; dichlobenil	bromacil + diuron (2:2); terbacil; cacodylic acid; chloraxuron
guineagrass		terbacil	cacodylic acid; glyphosate; terbacil; dalapon
hairy nightshade	cycloate; EPTC		cacodylic acid
hawksbeard		diuron; terbacil	terbacil; cacodylic acid
hemp sesbania	metribuzin; trifluralin + metribuzin		metribuzin; cacodylic acid

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
henbit (dead nettle)	cycloate; EPTC; trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin; pronamide	bromacil; terbacil; dichlobenil; pronamide	terbacil; cacodylic
horsenettle		terbacil	terbacil; cacodylic acid
horse purslane		napropamide; diuron; terbacil	terbacil; cacodylic acid
horsetail		dichlobenil	cacodylic acid
horseweed		bromacil + diuron (2:2)	cacodylic acid; paraquat; bromacil + diuron (2:2)
Jerusalem oak goosefoot		dichlobenil	cacodylic acid
jimsonweed	metribuzin; trifluralin + metribuzin		metribuzin; cacodylic acid; chloroxuron
johnsongrass (seedling)	EPTC; trifluralin; trifluralin + EPTC; napropamide; metribuzin; trifluralin + metribuzin; benefin	napropamide; chloramben; bromacil + diuron (2:2); simazine + ametryn; oryzalin	bromacil; ametryn; bromacil + diuron (2:2); dalapon; MSMA; cacodylic acid; paraquat
junglerice	bensulide; trifluralin; trifluralin + EPTC; benefin	bensulide; terbacil; simazine; bromacl + diuron (2:2)	terbacil; cacodylic acid; bromacil + diuron (2:2)
knotweed	trifluralin; trifluralin + EPTC; benefin; pronamide	terbacil; dichlobenil; pronamide	terbacil; cacodylic acid; paraquat

kochia (fireweed, Mexican fireweed)	trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	chloramben; diuron	cacodylic acid; glyphosate
ladysthumb			metribuzin; cacodylic acid
lambsquarters	bensulide; EPTC; DCPA; bensulide + naptalam; cycloate; trifluralin; trifluralin + EPTC; napropamide; metribuzin; trifluralin + metribuzin; benefin; pronamide	bensulide; DCPA; chloramben; bromacil; diuron terbacil; dichlobenil; bromacil + diuron (2:2); bromacil + diuron (2:1); oryzalin; simazine; pronamide	metribuzin; terbacil bromacil + diuron (2:2); bromacil + diuron (2:1); paraquat; cacodylic acid; glyphosate; chloroxuron
lovegrass	DCPA; EPTC; pronamide	DCPA; pronamide	cacodylic acid; chloroxuron
maidencane			dalapon; cacodylic acid
marestail		terbacil	terbacil; cacodylic acid
marigold		diuron	cacodylic acid
marinevine		simazine + ametryn	ametryn; cacodylic acid
maypops		dichlobenil	cacodylic acid
meadow salsify	metribuzin; trifluralin + metribuzin		cacodylic acid
Mexican clover		diuron	cacodylic acid
Mexicanweed			metribuzin; cacodylic acid
milkweedvine		dichlobenil	cacodylic acid
miners lettuce		dichlobenil	cacodylic acid; paraquat

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
muhly			cacodylic acid; glyphosate
mullein			cacodylic acid; glyphosate
mustards (blue, wild, tansey)	bensulide + naptalam; metribuzin; trifluralin + metribuzin; pronamide	chloramben; bromacil; diuron; terbacil; bromacil + diuron (2:2); simazine; dichlobenil; pronamide	metribuzin; terbacil; bromacil + diuron; cacodylic acid; paraquat; chloroxuron
natalgrass (redtop)		bromacil + diuron (2:1); bromacil; terbacil; dichlobenil	bromacil + diuron (2:1); cacodylic acid; terbacil; bromacil + diuron (2:2)
nettleleaf goosefoot	cycloate; EPTC; pronamide	pronamide	cacodylic acid
nightshade	trifluraln + EPTC; pronamide	terbacil; bromacil + diuron (2:2); simazine; bromacil + diuron (2:1); pronamide	terbacil; bromacil + diuron (2:2); cacodylic acid; glyphosate; bromacil + diuron (2:1)
oats	EPTC; pronamide	pronamide	cacodylic acid
orchardgrass		diuron; terbacil	cacodylic acid; terbacil; glyphosate
paragrass			bromacil; dalapon; glyphosate; cacodylic acid

Pennsylvania smartweed	metribuzin; trifluralin + metribuzin	chloramben	metribuzin; cacodylic acid; glyphosate
pennycress		diuron	cacodylic acid
pepperweed	metribuzin; trifluralin + metribuzin	diuron; terbacil; dichlobenil	terbacil; cacodylic acid
perennial ryegrass	benefin; pronamide	terbacil; pronamide	terbacil
phragmites			dalapon; cacodylic acid
pigweed (common)	EPTC; bensulide + naptalam; napropamide; benefin	chloramben; diuron; terbacil; bromacil + diuron (2:2); oryzalin; bromacil + diuron (2:1); simazine	metribuzin; paraquat; terbacil; bromacil + diuron (2:2); ametryn; cacodylic acid; bromacil + diuron (2:1); MSMA; chloroxuron
plantain			cacodylic acid; paraquat
pokeweed			cacodylic acid
prickly lettuce		terbacil; simazine	cacodylic acid; paraquat; terbacil; glyphosate
prickly sida	metribuzin; trifluralin + metribuzin; EPTC	chloramben	cacodylic acid
prostrate pigweed	trifluralin; EPTC; trifluralin + EPTC; napropramide; metribuzin; trifluralin + metribuzin	chloramben; simazine; oryzalin	metribuzin; cacodylic acid
Prostrate spurge			cacodylic acid; paraquat
puncturevine	trifluralin; trifluralin + EPTC	bromacil; bromacil + diuron (2:2)	bromacil + diuron (2:2); MSMA; cacodylic acid; paraquat; chloroxuron

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
purple nutsedge	cycloate; EPTC; trifluralin + EPTC		bromacil; MSMA; cacodylic acid
purslane (common)	trifluralin + EPTC; bensulide; EPTC; metribuzin; trifluralin + metribuzin; DCPA + naptalam; cycloate; trifluralin; napropamide; benefin; pronamide	bensulide; napropamide; DCPA; chloramben; diuron; simazine; dichlobenil; bromacil; terbacil; bromacil + diuron (2:2); bromacil + diuron (2:1); oryzalin; pronamide	diuron; bromacil + diuron (2:2); bromacil + diuron (2:1); cacodylic acid; ametryn; paraquat; terbacil; metribuzin; chloroxuron
rabbit tobacco		diuron	cacodylic acid
ragweed	bensulide + naptalam; metribuzin; trifluralin + metribuzin	dichlobenil; oryzalin; chloramben; diuron; simazine; bromacil + diuron (2:2); bromacil + diuron (2:1)	glyphosate; metribuzin; terbacil; cacodylic acid; bromacil + diuron (2:2); bromacil + diuron (2:1); chloroxuron
rattail		diuron; simazine	cacodylic acid
redroot pigweed	bensulide; EPTC; trifluralin; trifluralin + EPTC; napropamide; metribuzin; trifluralin + metribuzin	terbacil; bensulide; napropamide; chloramben; simazine; dichlobenil; oryzalin	terbacil; cacodylic acid; metribuzin
red sorrell		terbacil	terbacil; cacodylic acid
red sprangletop		diuron	cacodylic acid

red thistle		dichlobenil	cacodylic acid
rescuegrass	EPTC		cacodylic acid
ricegrass		diuron	cacodylic acid
Russian thistle	trifluralin; trifluralin + EPTC	chloramben; dichlobenil; simazine	metribuzin; glyphosate; paraquat; cacodylic acid
sandbur (field)	EPTC; trifluralin; benefin	bromacil + diuron (2:2); napropamide; bromacil; diuron; terbacil; simazine + ametryn; bromacil + diuron (2:1)	terbacil; glyphosate; ametryn; bromacil + diuron (2:2); bromacil + diuron (2:1); cacodylic acid; paraquat; MSMA
sedge (annual)		bromacil; terbacil	terbacil; cacodylic acid
shepherdspurse	cycloate; EPTC; bensulide + naptalam; metribuzin; trifluralin + metribuzin; pronamide	diuron; terbacil; oryzalin; dichlobenil; bromacil + diuron (2:2); pronamide	terbacil; paraquat; cacodylic acid; bromacil + diuron (2:2); chloroxuron
sicklepod	EPTC; metribuzin; trifluralin + metribuzin		metribuzin; cacodylic acid; chloroxuron
silver hairgrass		simazine	cacodylic acid
silverleaf nightshade			ametryn; cacodylic acid
small stingingnettle (burning nettle)	cycloate; trifluralin; trifluralin + EPTC		cacodylic acid
smartweed	pronamide	diuron; terbacil; simazine; dichlobenil; oryzalin; pronamide	terbacil; glyphosate; cacodylic acid; chloroxuron

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (continued)

Common name of weed on product label	Preplant	Preemergence	Postemergence
smooth pigweed	metribuzin; trifluralin + metribuzin	simazine	cacodylic acid; glyphosate
snoweed		terbacil	terbacil; cacodylic acid
spanishneedles		bromacil + diuron (2:2); bromacil + diuron (2:1); dichlobenil; simazine	bromacil + diuron (2:2); bromacil + diuron (2:1); cacodylic acid; ametryn; glyphosate
spotted spurge	metribuzin; trifluralin + metribuzin		cacodylic acid
spangletop	trifluralin + EPTC; bensulide; bensulide + naptalam; trifluralin	bensulide; bromacil	cacodylic acid; paraquat
spurred anoda	metribuzin; trifluralin + metribuzin		cacodylic acid
stinkgrass (lovegrass)	trifluralin; trifluralin + EPTC	chloramben	paraquat; cacodylic acid
sunflower	metribuzin; trifluralin + metribuzin	simazine + ametryn	ametryn; cacodylic acid
tansey mustard		diuron; terbacil; simazine	terbacil; cacodylic acid
teaweed		dichlobenil; oryzalin	cacodylic acid

Texas panicum	trifluralin; EPTC; trifluralin + EPTC; benefin	napropamide; bromacil; terbacil; simazine + ametryn; dichlobenil	terbacil; ametryn; dalapon; glyphosate; cacodylic acid
toadflax			metribuzin; cacodylic acid
torpedograss			bromacil; dalapon; cacodylic acid
tumble pidweed	EPTC; napropamide	diuron; simazine	cacodylic acid
turkey mullein		bromacil	cacodylic acid
vaseygrass			dalapon; cacodylic acid
velvetleaf	bensulide + naptalam; metribuzin; trifluralin + metribuzin	chloramben; diuron; oryzalin	metribuzin; glyphosate; cacodylic acid
venice mallow	metribuzin; trifluralin + metribuzin		cacodylic acid
watergrass			cacodylic acid; paraquat
wheat	EPTC; pronamide	pronamide	cacodylic acid; glyphosate
white cockle	metribuzin; trifluralin + metribuzin		cacodylic acid
wild barley		terbacil; dichlobenil	terbacil; cacodylic acid
wild buckwheat	metribuzin; trifluralin + metribuzin	diuron	cacodylic acid
wild cane (shattercane)	EPTC		glyphosate

Table 1. List of weeds in horticultural crops, time of treatments and herbicide control. See table 14 for product name of herbicides. Specific herbicide rates for control of weeds are listed on the product label. (concluded)

Common name of weed on product label	Preplant	Preemergence	Postemergence
wild geranium		terbacil	terbacil; cacodylic acid
wild lettuce		diuron; bromacil + diuron (2:2)	cacodylic acid; bromacil + diuron (2:2)
wild oats	cycloate; EPTC; metribuzin; trifluralin + metribuzin	simazine; oryzalin	dalapon; paraquat; cacodylic acid
wild radish		diuron; dichlobenil	cacodylic acid; paraquat
witchgrass	DCPA; EPTC	DCPA; simazine; dichlobenil	cacodylic acid
yellow foxtail	EPTC; bensulide; bensulide + naptalam; cycloate; trifluralin; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	bensulide; chloramben	cacodylic acid
yellow nutsedge	EPTC; cycloate; trifluralin + EPTC; metribuzin; trifluralin + metribuzin	terbacil	terbacil; bromacil; MSMA; cacodylic acid
yellow rocket	metribuzin; trifluralin + metribuzin	terbacil	terbacil; cacodylic acid
yellow woodsorrel		dichlobenil	cacodylic acid

Table 2. Beans - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Beans - green or dry (Do not use Eptam on adzuki beans, blackeyed beans, lima beans or other flat-podded beans except Romano. Under abnormal weather conditions, stunting may occur on Gratiot, Michillite, Sanilac, Seafarer and Seaway varieties.)	Eptam 7-E 3 1/2 pt.	EPTC 3.06 lb.	10 to 50 gal. water (Do not tank mix Eptam 7-E with fungicide or with insecticides.)	Just before planting. Preplant incorporate flat planted only. Rotary hoe lightly during or shortly after emergence of beans to break any crust.	When possible, apply and incorporate in the same operation to prevent loss of herbicide. Incorporate with either power-driven cultivator, tandem disk, field cultivator or rotary ground-driven or spring-tooth cultivator. See Eptam 7-E label for specific equipment settings. Use on mineral soils only.

Table 2. Beans - vegetables (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Dry beans--kidney, navy, pinto, etc.	Eastern Texas Treflan 1 pt. on coarse soil; 1.5 pt. on medium soil; 2 pt. on coarse soil with 2 to 5% organic matter, or 2 pt. on soil with 5.1 to 10% organic matter Western Texas Treflan 1 pt. on coarse soil; 1.25 to 1.5 pt. on medium soil; 1.5 pt. on fine soil; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground or 5 to 10 gal. water by aircraft	Preplant. Incorporate one time within 24 hr. after treatment, follow with a second incorporation, or both trips one following the other. Avoid applying Treflan on wet, warm soil or when wind velocity is 5 mph or higher for aircraft method.	Incorporate into the top 2 to 3 in. of the final seedbed. See label for additional information about incorporation and methods. In western Texas, do not plant grain sorghum or oats for 12 mo. after treatment or 18 mo. after treatment if less than 25 in. of total water was used to produce a crop.

Dry beans--kidney, navy, pinto (Do not use on adzuki beans, blackeyed beans, lima beans and other flat-podded beans, except Romano.)	Treflan 1 pt. + Eptam 7-E 1.75 pt. (tank mixture) or up to the labeled rate for each herbicide depending on soil texture and weed problem. (Treflan at 1 pt. alone or combined with Eptam 7-E should not be used on Texas soils containing 5% organic matter or more.)	Trifluralin 0.5 lb. + EPTC 1.53 lb. or up to labeled rate of each herbicide	5 to 40 gal. water	From 2 days before planting, up to planting. Incorporate into soil immediately after treatment.	Follow normal Treflan procedures for soil preparation. See Eptam 7-E label for additional information about soil incorporation. Do not use foliage from crop treated with Treflan + Eptam 7-E tank mix for feed or grazing. In western areas, do not plant grain sorghum or oats for 12 mo. after Treflan, or 18 mo. after treatment if less than 25 in. of water was used to produce the crop.

Table 2. Beans - vegetables (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Lima and snap beans	Treflan 1 to 1.5 pt.	Trifluralin	5 to 40 gal. water	Incorporate before planting. Avoid applying Treflan on wet warm soil or when wind velocity is 5 mph or higher for aircraft method.	Incorporate Treflan into the top 2 to 3 in. of the final seedbed. See label for directions with incorporation equipment. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan, or 18 mo. after treatment if less than 25 in. of total water was used to produce the crop.
Field and snap beans	Dacthal W-75 6 to 14 lb.	DCPA 4.5 to 10.5 lb.	At least 20 gal. water by ground or a minimum of 10 gal. water by aircraft	Either preplant (incorporated before first planting) or preemergence (after planting).	Do not graze treated areas or feed plant refuse, vines or threshings to livestock. A minimum of 1/3 to 1/2 inch of water either as rain or irrigation is necessary to activate Dacthal W-75. If sufficient rain does not fall within 3 to 5 days, apply water.

Table 3. Peas - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Southern peas	Eastern Texas Treflan 1 pt. on coarse, 1.5 pt. on medium, 2 pt. on fine soils; 1.5 to 2 pt. on coarse soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter. Western Texas Treflan 1 pt. on coarse, 1.25 to 1.5 pt. on medium; 1.5 pt. on fine soils, 1.5 to 2 pt. on soils with 2 to 5% organic matter, and 2 pt. on soils with 5.1 to 10% organic matter.	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft.	Soil incorporate before planting. Avoid spraying by aircraft when wind is over 5 mph.	Incorporate into the top 2 to 3 in. of final seedbed. Avoid applying Treflan on wet, warm soil or to soil subject to flooding. See label for other directions. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. if less than 25 in. of water was used to produce the crop.

Table 4. Cucurbits - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Cucumbers, summer squash, winter squash, cantaloupes, crenshaw melons, muskmelons, Persian melons, watermelons	Prefar 4-E 5 to 6 qt. (Use on mineral soils only.)	Bensulide 5 to 6 lb.	10 to 50 gal. water (Do not apply in combination with fluid fertilizer.)	Preplant to a well-worked soil dry enough to permit thorough incorporation. Do not apply Prefar 4-E more often than once every 12 mo.	Incorporate to a depth of 1 to 2 in. before planting. Use power-driven rotary cultivators or other equipment. Do not plant crops not specified on the label until 18 mo. after the last Prefar 4-E application. Labeled crops can be planted in rotation.

Cantaloupes, cucumber and watermelons	Treflan 1 pt. on coarse soils; 1.25 to 1.5 pt. on medium soils; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1.0 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft	When plants are in 3- to 4-leaf stage. Avoid applying Treflan on wet, warm soil and when wind velocity is 5 mph or higher.	Apply as a directed spray to soil between rows and beneath plants. Set incorporation equipment to throw treated soil toward plants in the row. See label for incorporation methods. In western Texas, do not plant grain sorghum or oats for 12 mo. after treatment if less than 25 in. of total water was used to produce a crop.
Cantaloupes, cucumbers, muskmelons and watermelons	Prefar 4-E 4 to 6 qt. + Alanap 4 to 8 qt. (tank mixture) (Follow all general directions and precautions that appear on the labels.)	bensulide 4 to 6 lb. + naptalam 2 to 4 lb.	10 to 40 gal. water	Before planting	Use suitable equipment for incorporation 1/2 to 1 inch. Incorporation is not necessary if the application is followed by immediate irrigation. Do not use Alanap on sands and loamy-sand soils.

Table 4. Cucurbits - vegetables (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Cucumbers, squash (summer and winter), cantaloupes, honeydew melons and watermelons	Either Dacthal W-75 6 to 14 lb. or Dacthal 5-G 160 to 210 lb.	DCPA 4.5 to 10.5 lb.	At least 20 gal. water or granular	When plants are well-established with 4 to 5 true leaves and growing conditions are favorable.	Cultivate the crop before application if weeds have emerged. NOTE: Crops not included on the Dacthal labels may be injured if replanted in Dacthal-treated soil within 8 mo. after application. Onions, seeded melons, potatoes, tomatoes, eggplants or peppers replanted because of an early crop failure in Dacthal-treated soil may be injured. However, all crops on the Dacthal labels may be planted following harvest of a Dacthal-treated crop.
Pumpkin and squash	Either Amiben 10%G 30 to 40 lb., or Amiben 1.5 to 2 gal.	Chloramben 3 to 4 lb.	10 to 15 gal. water	Preemergence	Apply to weed-free soil. After the squash and pumpkin emerge, use normal cultivations to control weeds that grow in untreated areas.

Table 5. Cole crops - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Broccoli, brussels sprouts, cauliflower, head or leaf lettuce and cabbage	Prefar 4-E 5 to 6 qt. (Use on mineral soils only.)	Bensulide 5 to 6 lb.	10 to 50 gal. water. (Do not apply in combination with fluid fertilizer.)	Either apply before planting to well-worked soil that is dry enough to permit thorough incorporation or after planting as a surface application. Do not apply Prefar 4-E more than every 12 mo.	Incorporate the preplant treatment 1 to 2 in. deep before planting. Use power-driven rotary cultivators or other equipment to incorporate. Follow preemergence treatment immediatly with irrigation. For sprinkler irrigation, apply 1 in. of water wetting the soil at least 2 to 4 in. deep. For furrown irrigation, thoroughly saturate the entire bed top. Do not plant crops not specified on the label until 18 mo. after the last application of Prefar 4-E. Labeled crops can be planted in rotation.
Lettuce	Balan 3 to 4 ft.	Benefin 1.1 to 1.5 lb.	5 to 40 gal. water	Preplant incorporate	Incorporate Balan before seeding. Do not apply after seeding.

Table 5. Cole crops - vegetables (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Direct seeded--Broccoli, brussels sprouts, cabbage and cauliflower. NOTE: In eastern Texas these cole crops exhibit marginal tolerance to recommended rates of Treflan. Stands may be stunted or reduced.	Eastern Texas Treflan 1 pt. on coarse and medium soils, and 1.5 pts. on fine soils and coarse soils with 2 to 5% organic matter. Western Texas Treflan 1 pt. on coarse, medium and fine soils; and 1.5 pts. on soils with 2 to 10% organic matter.	Trifluralin 0.5 to 0.75 lb.	5 to 40 gals. water per acre by ground; 5 to 10 gals. water by aircraft.	Incorporate before planting. Avoid applying Treflan on wet, warm soil or when wind velocity is 5 mph or higher for aircraft method.	Use incorporation equipment to place Treflan into top 2 to 3 in. of the final seedbed. See label for directions with incorporation equipment. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total water was used to produce the crop.
Broccoli brussels sprouts and cauliflower	Either Dacthal W-75 6 to 14 lb. or Dacthal 5G 160 to 210 lb.	DCPA 4.5 to 10.5 lb.	At least 20 gal. water or granular	From pre-emergence to weeds at seedling or transplanting	Dacthal can be sprayed directly over transplants. Apply Dacthal to weed-free soil. See NOTE table 4 DCPA.
Lettuce	Kerb 50-W at 2 to 4 lbs. preemergence or 3 to 4 lbs. soil incorporated	Pronamide 1 to 2 lbs.	20 to 50 gals. water	Either preplant or preemergence	Use in direct seeded or transplanted lettuce.

Transplant--broccoli, brussels sprouts, cabbage and cauliflower	Eastern Texas Treflan 1 pt. on coarse soils; 1.5 pt. on medium soils; 2 pt. on fine soils; 1.5 pt. on coarse soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter Western Texas 1 pt. on coarse; 1.25 to 1.5 pt. on medium; 1.5 on fine soils; 1.5 to 2 pt. on soils with 2 to 5% organic matter, and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft	Before transplanting by soil incorporation. Avoid applying Treflan on wet, warm soil or when wind velocity is 5 mph or higher for aircraft.	Use incorporation equipment to place Treflan into top 2 to 3 in. of the final seedbed. See label for directions with incorporation equipment. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total water was used to produce the crop.

Table 6. Greens - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Collards, kale, mustard greens and turnips (greens and roots)	Either Dacthal W-75 6 to 14 lb. or Dacthal G-5 160 to 210 lb.	DCPA 4.5 to 10.5 lb.	At least 20 gal. water or granular	Preplanting or preemergence for Dacthal W-75 but preemergence for Dacthal 5-G	Do not preplant incorporate deeper than 2 in. Use disk harrow or hooded-power driven rotary tillers or ground-driven tillers. See NOTE table 4.
Turnips (grown for processing) and all collard, kale and mustard greens	Treflan 1 to 1.5 pt.	Trifluralin 0.5 to 0.75 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft	Before planting, avoid applying Treflan to a wet, warm soil and when wind velocity is 5 mph or higher for aircraft method.	A soil-incorporated treatment into the 2 to 3 in. of the final seedbed. See label for directions of incorporation. See label for directions for soil incorporation. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total water was used to produce a crop.

Spinach	Roneet 6-E 2 qt. (Use on sandy mineral soils only.)	Cycloate 3 lb.	20 to 50 gal. water. Do not tank mix Roneet 6-E with insecticides or fungicides unless the compatibility has been proven satisfactory.	Before planting to well-worked soil dry enough to permit thorough mixing with incorporation equipment	Immediately (within minutes) after application, thoroughly mix Roneet 6-E into the soil to a depth of 2 to 3 in. If possible, spray and incorporate in the same operation. Follow label directions for other information and for setting incorporation equipment: power-driven cultivator, tandem disk, field cultivator, rotary-ground driven or spring-tooth cultivator. Between the incorporation unit and the planters, rolling is suggested under most conditions.

Table 7. Fruiting vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Tomatoes (direct seeded) or transplanted)	Eastern Texas for directed seeded or before transplanting: Treflan 1 pt. on coarse; 1.5 pt. on medium; 2 pt. on fine soils; 1.5 pt. on coarse soils with 2 to 5% organic matter and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground; 5 to 10 gal. of water by aircraft	Do not spray with aircraft if wind is 5 mph or higher. For direct seeded: At blocking or thinning as a spray to the soil between the rows and beneath the plants and incorporate.	Incorporate into the top 2 to 3 in. of the final seedbed. Avoid applying Treflan on wet, warm soil. See label for incorporation and other directions. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total rainfall was used to produce a crop.
	Western Texas for either direct seeded of before transplanting: Treflan 1 pt. on coarse; 1.25 to 1.5 pt. on medium; 1.5 pt. on fine soil; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter			For transplants: Apply and incorporate before transplanting. Do not apply after transplanting.	

Tomatoes (direct seeded or transplanted) and peppers	Devrionl 50-WP 2 to 4 lb. (Use lower rate on light soil-coarse textured, and the higher rate on heavy soil-fine textured.)	Napropamide 1 to 2 lb.	20 to 100 gal. water per acre	Preplant incorporate 1 to 2 in. deep	Incorporate the same day as applied with equipment which will incorporate to desired depth. After harvest and before planting succeeding crop, plow or disk. Do not seed to alfalfa, small grains, sorghum, corn, lettuce or sugar beets for 12 mo. after Devrinol 50-WP application.
Tomatoes, eggplants and peppers	Either Dacthal W-75 6 to 14 lb. or Dacthal G-5 150 to 210 lb. or Dacthal G-5 150 to 210 lb.	DCPA 6 to 10.5 lb.	At least 20 gal. water or granular	4 to 6 weeks after transplanting. Plants should be well established and growing conditions favorable. Do not apply on seeded plants until plants are 4 to 6 in. high.	Dacthal W-75 or G-5 can be applied directly.

Table 7. Fruiting vegetables (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Tomatoes (transplanted)	Lexone 50-WP 0.5 to 1 lb. alone or + Treflan 1 to 2 pt. (tank mixture) (See label for soil types and rates.)	Metribuzin 0.25 to 0.5 lb.	10 to 40 gal. water	Apply immediately before transplanting.	Incorporate uniformly 2 to 4 in. deep. Crop rotation: Do not replant treated areas to any crop other than tomatoes within 4 mo. after treatment. Alfalfa, asparagus, corn, forage grasses, potatoes, soybeans and sugarcane may be planted in treated areas 4 mo. after applications of Lexone. Do not plant treated areas to cole crops, cucurbits, lettuce, onions or beets (sugar or table) during the next growing season. Cover crops may be planted any time but stand reductions may occur.

Tomatoes (established)	Lexone 50-WP 0.5 to 1 lb.	Metribuzin 0.25 to 0.5 lb.	20 to 75 gal. water	Broadcast when weeds are 1 in. tall. Allow at least 14 days between applications. Begin treatment when tomatoes have reached the 5- to 6-leaf stage, or when transplants have recovered from transplant shocks and new growth has started. Apply only if there have been at least 3 successive days of sunny weather. Do not apply within 24 hr. of treatment with other pesticides.	One or more applications may be made per crop season. Do not apply more than 2 lb. total within a 35-day period or per crop season. Do not tank mix with other pesticides. See crop rotation under Tomatoes (transplant) in this table.

Table 7. Fruiting vegetables (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Tomatoes (established)	Lexone 50-WP 1 to 2 lb. (Do not apply more than 2 lb. total within a 35-day period or per crop season that may include preplant, postemergence broadcast and directed postemergence. Determine tomato tolerance before adopting Lexone as a field practice.)	Metribuzin 0.5 to 1 lb.	20 to 75 gal. water	After 5- to 6-leaf stage. Do not apply within 7 days of harvest. Apply only if there have been at least 3 successive days of sunny weather before application. Do not apply within 24 hr. of treatment of other pesticides.	This method is used on fields with heavy weed infestation or hard to control weeds. See crop rotation above under Tomatoes (transplanted). Do not allow spray to contact tomato foliage. Do not use hot caps on tomatoes within 7 days before or any time after treatment.

Tomatoes (direct seeded or transplanted) and chilipeppers	Prefar 4-E 5 to 6 qt.; 4 to 5 qt. for tomatoes (Use on mineral soils only.)	Bensulide 5 to 6 lb.; 4 to 5 lb. for tomatoes	10 to 50 gal. water. (Do not apply in combination with fluid fertilizer.)	Either apply before planting to well-worked soil that is dry enough to permit thorough incorporation or use as a surface application after planting. Do not apply Prefar 4-E more than once every 12 mo.	Incorporate the preplant treatment 1 to 2 in. deep before planting. Use power-driven cultivators or other equipment. Follow preemergence treatment immediately with irrigation. For sprinkler irrigation, apply 1 in. of water wetting the soil at least 2 in. deep. For furrow irrigation, thoroughly saturate the entire bed top. Do not plant crops not specified on the label until 18 mo. after the last Prefar 4-E application. Labeled crops can be planted in rotation.
Peppers (transplants only)	<u>Eastern Texas</u> Treflan 1 pt. on coarse; 1.5 pt. on medium; 2 pts. on fine soils with 2 to 5% organic matter <u>Western Texas</u> Treflan 1 pt. on coarse; 1.25 to 1.5 pt. on medium; 1.5 pt. on fine soils; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft.	Apply and incorporate before transplanting. Avoid application by aircraft when wind is 5 mph or higher.	Incorporate into the top 2 to 3 in. of the final seedbed. Avoid applying Treflan on wet, warm soil. See label for use directions. In western Texas, do not plant oats or grain sorghum for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total water was used to produce a crop.

Table 8. Okra - vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Okra	Eastern Texas Treflan 1 pt. on coarse; 1.5 pt. on medium; 2 pt. on fine soil; 1.5 to 2 pt. on coarse soils with 2 to 5% organic matter and 2 pt. on soils with 5.1 to 10% organic matter Western Texas Treflan 1 pt. on coarse; 1.25 to 1.5 pt. on medium; 1.5 pt. on fine soil; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5.1 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground	Soil incorporate before planting	Avoid spraying Treflan on wet, warm soil or soil subject to flooding. Use incorporation equipment to place Treflan into 2 to 3 in. of the final seedbed. See label for directions. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of water was used to produce the crop.

Table 9. Root crop vegetables.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Onions and garlic	Dacthal W-75 6 to 14 lb. or Dacthal G-5 160 to 210 lb. In sandy loam soils, a maximum preemergence rate of 10 lb. W-75 per acre is suggested.	DCPA 4.5 to 1.5 lb.	At least 20 gal. water or granular	Either immediately after seeding or after transplanting. A layby treatment can be made on onions up to 14 days after planting or transplanting.	Either Dacthal W-75 or G-5 can be applied directly over transplants. Cultivate any weeds before a layby treatment. See NOTE table 4.
	Norex 50-WP 4 lb.	Chloroxuron 2 lb.	25 to 40 gal. a water plus 1% emulsified nonphytotoxic oil with a U.R. number of 93 or greater which has been tested and found compatible with Norex 50-WP	Postemergence over the top after onions have reached the 2 to 3 true-leaf stage of growth	Do not apply within 30 days before harvest. Do not use Norex 50-WP on light sandy soils with less than 1% organic matter.

Table 9. Root crop vegetables (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Carrots	Eastern Texas Treflan 1 pt. on coarse; 1.5 pt. on medium; 2 pt. on fine soils; 1.5 to 2 pt. on coarse soil with 2 to 5% organic matter Western Texas Treflan 1 pt. on coarse; 1.25 to 1.5 pt. on medium; 1.5 pt. on fine soils; 1.5 to 2 pt. on soils with 2 to 5% organic matter; and 2 pt. on soils with 5 to 10% organic matter	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water by ground; 5 to 10 gal. water by aircraft	Incorporate before planting. Avoid applying Treflan on wet, warm soil and when wind velocity is 5 mph or higher.	Incorporate into the top 2 to 3 in. of the final seedbed. See label for additional information about incorporation and methods. In western Texas, do not plant grain sorghum or oats for 12 mo. after Treflan or 18 mo. after treatment if less than 25 in. of total rainfall was used to produce a crop.

Onions--bulb, and carrots	Prefar 4-E 5 to 6 qt. (Use on mineral soils only.)	Bensulide 5 to 6 lb.	10 to 50 gal. water. (Do not apply in combination with fluid fertilizer.)	Preplant to well-worked soil dry enough to permit thorough incorporation. Do not apply Prefar 4-E more often than every 12 mo.	Incorporate the preplant treatment to a depth of 1 to 2 in. before planting. Use power-driven rotary cultivators or other equipment. Follow preemergence treatment immediately with irrigation. For sprinkler irrigation, apply 1 in. of water wetting the soil at least 2 to 4 in. deep. For furrow irrigation, thoroughly saturate the entire bed top. Do not feed treated carrots to livestock.
Table beets	Roneet 6-E 2 to 2.66 qt. (Use on mineral soils only.)	Cycloate 3 to 4 lb.	Use 20 to 50 gal. water. (Do not tank mix Roneet 6-E with insecticides or fungicides unless the compatibility has been tested and proven. When applying Roneet 6-E in combination with fluid fertilizer, do not apply over 150 lb. actual nitrogen per acre.)	Before planting	Apply to well-worked soil dry enough to permit thorough mixing with incorporation equipment. Immediately (within minutes) after application, thoroughly mix Roneet 6-E into the soil 2 to 3 in. deep. If possible, spray and incorporate in the same operation. Follow label directions for setting incorporation equipment: power-driven cultivator, rotary ground-driven or springtooth cultivator. Rolling is suggested under most conditions between the incorporation unit and the planters.

Table 9. Root crop vegetables (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Sweet potatoes	Eptam 7-E 2.25 to 3.5 pt.	EPTC 1.97 to 3.06 lb.	10 to 50 gal. water. (Do not mix Eptam 7-E with fungicides or with insecticides.)	Just before planting	Incorporate to a maximum depth of 3 in. When possible, apply and incorporate in the same operation to prevent the losss of the herbicide. Incorporate with either power-driven cultivator, tandem disk, field cultivator or rotary ground-driven or spring-tooth cultivator. See Eptam 7-E label for specific setting for equipment.
	Eptam 7-E 8.5 pt.	EPTC 7.44 lb.		Immediately or within 2 days after planting slips or vine cuttings	Apply to dry soil surface and do not mix into the soil. Apply as a solid overall spray before irrigation.
	Amiben 2 gal.	Chloramben 4 lb.	10 to 20 gal. water	Immediately after transplanting	Do not disturb treated areas with the first cultivation if band treated. For final cultivation, set sweeps closer to pull soil as high as possible over the sweet potato row and treated band.

Sweet Potatoes	Either Dacthal W-75 6 to 14 lb. or Dacthal 5-G 160 to 210 lb.	DCPA 4.5 to 10.5 lbs.	At least 20 gal. water or granular	At transplanting and layby preemergence of weeds. Layby applications can be made up to 6 weeks after transplanting. The soils should be free of weeds when the Dacthal is applied	Dacthal can be sprayed directly over transplants without injury. See NOTE table 4.
Irish potatoes	Eptam 7-E 1.7 pt. + Treflan 1 pt. (tank mixture) (On all soil textures or up to the label rates for each herbicide depending upon soil texture and weed problem.)	EPTC 1.35 lb. + trifluralin 0.5 lb. NOTE: Either herbicide can be used alone. See label for specific use directions.	5 to 40 gal. water by ground	After planting but before crop emergence. In areas where potatoes are normally dragged off, apply and incorporate up to or immediately following drag off.	Follow normal Treflan procedures for soil preparation. Incorporate Eptam 7-E + Treflan immediately after application. See the Eptam 7-E label before using. Also, read the Treflan label instructions. Do not feed forage to livestock from fields treated with Treflan + Eptam 7-E tank mixture.

Table 9. Root crop vegetables (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Irish potatoes (whole or cut pieces)	Either Lexone 50% 1 to 2 lb.; Lexone 4-L 1 to 2 pt.; or Lexone D-F 0.66 to 1.33 lb.	Metribuzin 0.5 to 1 lb.	10 to 40 gal. water per acre	Preemergence	Make single application after planting or after drag-off but before crop emerges. Do not plant crops other than potatoes for 1 year after treatment.
	Either Dacthal W-75 or Dacthal 5-G 160 to 210 lb.	DCPA 4.5 to 10.5 lb.	At least 20 gal. water or granular	At planting, drag-off or layby pre-emergence of weeds. The soil should be weed-free at treatment. If the top of the beds are to be dragged off, apply Dacthal after drag-off. Layby applications can be made up to 9 weeks after planting.	The initial sprinkler irrigation following Dacthal should not exceed 1 in. See NOTE table 4.

Table 10. Sweet corn and popcorn.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Sweet corn and popcorn	Eradicane 4.75 to 7.33 pt.	EPTC 4 to 6 lb.	10 to 50 gal. water	Preplant incorporate into soil	Plant seed to a maximum of 2 in. within 2 weeks after treatment. Avoid moving soil after treatment such as by planting in deep furrows.
	NOTE: Sutan, Lasso, Bexton, Ramrod, Aatrex, Princep and some combinations of these herbicides are labeled. Read labels for directions.				

Table 11. Tree fruits and nuts.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Apples, pears and pecans	Roundup 1 qt. to weeds less than 6 in. tall, but 1.5 qt. to weeds over 6 in. tall	Glyphosate 0.75 to 1.1 lb.	20 to 60 gal. water	When grasses and broadleaf weeds are actively growing. Allow a minimum of 14 days between application and harvest for apples and pears and 21 days for pecans.	Use in established groves or orchards or for site preparation before transplanting.
	Treating specific perennial weeds with Roundup				
	Johnsongrass	2 to 3 qt. per acre, foot-to-head stage of growth. In fall, apply before johnsongrass turns brown.			
	Guineagrass	3 qt. per acre, or use a 1% solution (1 qt. per 25 gal. water) with hand-held equipment. Apply to actively growing, 7-leaf stage guineagrass.			
	Field bindweed and Silverleaf	Apply 4 to 5 qt. to actively growing weeds in full bloom stage. For best results on silverleaf nightshade, apply after berries are found. Apply in late summer or fall.			
	Bermudagrass	Apply 5 qt. to actively growing grass when seed heads appear.			

Apples, peaches, pears and plums	Bueno 6 2-2/3 pts., or Super Arsonate 1 qt. (For spot treatment, mix 1 qt. of Super Arsonate plus 1 to 2 qt. surfactant in 50 gal. of water or 2-2/3 pt. of Bueno 6 in 50 gal. of water and apply to a point of runoff.	MSMA 2 lb.	100 gals. water. For Super Arsonate, only mix 1 to 2 qt. of a suitable surfactant in 100 gal. of water.	After weed emergence when weeds are small and during weather when conditions favor weed growth. Apply less than three times per year.	Apply to nonbearing orchards. Do not allow spray to contact foliage, stems or backs of trees. Do not use near trees from which crops will be harvested within 1 year. Do not graze livestock in treated areas.
	Dowpon M 5 to 10 lb. for apples and pears, and 6 to 7 lb. for peaches and plums	Dalapon 3.7 to 7.4 lbs.	10 to 100 gal. plus 1/2 to 2 pt. per 100 gal. of spray. (For perennial grasses, add 4 pt. per 100 gal. of spray.)	When grasses are growing well before heading. Apply when soil moisture is high. Use one or two applications per season. Do not apply within 30 days of harvest.	Use a low rate for apple and pear trees less than 4 yr. old. Apply as spot, band or broadcast treatment. Spray to wet the grass without runoff. Do not spray bare ground under fruit trees. Do not graze livestock on treated areas during application season.

Table 11. Tree fruits and nut (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Apples, peaches, pecans, pears and plums	Paraquat CL 1 to 2 qt.	Paraquat 0.5 to 1 lb.	50 to 200 gal. water (Use 30 to 50 gal. water for pecans.) Add Ortho X-77 spreader (non-ionic) at 8 oz. per 100 gal.	When weeds and grasses are succulent and new growth is 1 to 6 in. high. Do not spray under windy conditions. Do not apply when nuts to be harvested are on the ground.	Retreatment may be necessary for perennial weeds. Do not allow spray to contact green stems, fruits or foliage. Use shield for young trees. Do not allow animals to graze on treated areas.
Pecan (new plantings)	Treflan 1.5 to 2 pt.	Trifluralin 0.75 to 1 lb.	5 to 40 gal. water	Before planting	Soil incorporate. Follow label for rates on soil types and organic matter content.
Pecan, peaches and plums (nonbearing and bearing)	Treflan 2 to 4 pt.	Trifluralin 1 to 2 lb.	As above	Before weed emergence	Apply as a directed spray to the soil around the trees and use incorporation methods safe for the trees. Use on peach and plum only where less than 20 to 25 in. of rain falls per year.

Apples, peaches, pecans, pears and plums	Either Casaron 4-G 100 to 150 lb. or Casaron 50-WP 8 to 12 lb.	Dichlobenil 4 to 6 lb.	At least 50 gal. water for wettable powder	Early spring, before seeds of annula weeds germinate or after cultivation has removed the growing weeds. Do not apply within 1 mo. of harvest of stone fruits or nuts. Do not apply on fruit stock within 3 mo. of grafting or budding of root stocks or planting of new grafts. Do not apply until 4 weeks after transplanting.	Shallow incorporation or sprinkler irrigation is suggested where applications are made during periods of high temperature. Do not graze livestock on treated areas.

Table 11. Tree fruits and nut (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
	Princep 80-W 2.5 to 5 lb. for apples, pecans, pears; and 2 to 5 lb. for peaches. (For pecans, do not use west of the Pecos River in Texas.) Or use Princep 4-L 2 to 4 qt. for apples	Simazine 1.6 to 4 lb.	20 to 40 gal. water	For pecans, before weeds emerge in spring; for peaches, apply in late fall or early spring, and preemergence for apples and pears. Apply only once per year.	Spray orchard floor avoiding contact with fruit foliage or stems. Apply where trees have been established for at least 1 yr. Do not use on sandy or gravelly soil.
Apples, peaches, pecans and pears	Princep 80-W 2.5 to 5 lb. for apples, pecans and pears; and 2 to 5 lb. for peaches + Paraquat CL 1 to 2 qt.	Simazine 1.6 to 4 lb. + paraquat 0.5 to 1 lb.	50 to 200 gal. (30 to 50 gal. for pecans) of water. Add a nonionic surfactant such as X-77 at 0.5 pt. per 100 gal. of spray. Following label mixing instructions.	Apply when weeds are succulent and new growth is 1 to 6 in. tall. Treat perennials again with Paraquat if growth reoccurs.	Apply to orchard floor avoiding contact with fruit, foliage and stems. Do not apply to sandy, gravelly sand or loamy sand soil. Do not treat around transplanted pecan trees that have been established less than 2 yr.

	Either Surflan 2 to 4 qt., or Surflan 75% 2.66 to 5.33 lb.	Oryzalin 2 to 4 lb.	20 to 40 gal. water	Preemergence on soil in good tilth, firm and free of clods. Do not apply to newly transplanted fruit trees until soil has settled and there are no cracks. Do not apply more than once per season.	For nonbearning plantings, spray directly on the orchard or vineyard floor. Do not allow the spray to contact leaves, branches or trunks of trees.
Apples, peaches and pecans	Sinbar 80-W 1 to 2 lb. + Karmex 1 to 2 lb. (Do not use on sand or loamy sand soil. See label for rates on soil types. Either product can be used alone. See labels for details.)	Terbacil 0.8 to 1.6 lb. + diuron 0.8 to 1.6 lb.	Minimum of 30 gal. water	Either in spring or after harvest in the fall before weeds emerge or during early seedling stage of weed growth. Make a single band or	Use only under trees established in the orchard for at least 2 yr. or pecan trees established for at least 1 yr. Where crop is grown under furrow irrigation or under raised-brem flood irrigation (trees 4 to 6 in. above waterline) apply only as a band treatment. Do not

Table 11. Tree fruits and nut (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
				broadcast application.	treat trees planted in the bottom of irrigation furrows or trees grown under flat flood or basin irrigation and do not use on eroded areas where subsoil or tree roots are exposed.

Table 12. Small fruits.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Blackberries	Princep 80-W 2.5 to 5 lb. in the spring, or apply a split application of 2.5 lb. in spring plus 2.5 lb. in the fall	Simazine 2 to 4 lb.	Minimum of 40 gal. water	Preemergence, spring or fall. Do not apply when fruit is present.	On plantings less than 6 mo. old, use one-half of the labeled rates.
	Paraquat CL 1 to 2 qt.	Paraquat 0.5 to 1 lb.	50 to 200 gal. water. Use 8 oz. of Ortho 77 spreader (non-ionic) at 8 oz. per 100 gal. water.	Apply after weed emergence of new canes or shoots.	Avoid spraying on shoots and canes. Apply as a coarse spray to avoid drift injury from fine spray mist. Paraquat is a restricted-use pesticide.

Table 13. Citrus.

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Grapefruit and oranges (nonbearing groves)	Eptam 7-E 3.5 to 7 pt.	EPTC 3.06 to 6.12 lb.	10 to 50 gal. water. (Do not mix Eptam 7-E with fungicides or insecticides.)	After lining out	Apply as a directed spray to the soil. Incorporate with cultivation equipment, such as tree hoes and rotary hoes.
Grapefruit and oranges (bearing groves)	Eptam 7-E 3.5 pt.	EPTC 3.06 lb.	By flood or furrow irrigation. (Meter Eptam 7-E into the water during the entire irrigation period.)	After clean cultivation or before weeds emerge.	Do not apply within 15 days before harvest.
Grapefruit, oranges and tangerines (bearing and nonbearing groves)	Casaron 4% G 75 to 150 or Casaron W-50 6 to 12 lb.	Dichlobenil 3 to 6 lb.	At least 50 gal. water	Apply on weed-free soil and incorporate immediately 1 to 2 in.	Incorporate with power-driven rotary hoe. Do not apply less than 1 yr. after transplanting. Do not apply Casaron during 6 mo. following freeze damage to any citrus.
Oranges, grapefruit and tangerines	Treflan 1 to 2 pt. (See labeled rates for soil types and organic matter percentage.)	Trifluralin 0.5 to 1 lb.	5 to 40 gal. water	Preplant	Apply only to areas for new plantings. See label for incorporation methods.

Oranges, grapefruit and tangerines	Treflan 2 to 4 pt. May be applied twice.	Trifluralin 1 to 2 lb.	5 to 40 gal. water	Preplant. If used twice, apply at an interval of 4 to 6 mo.	Apply as a directed spray to the soil around trees and use incorporation methods not injurious to the trees. Apply under established nonbearing plantings of citrus and bearing plantings of oranges, grapefruits and tangerines.
Grapefruit and oranges	Devrinol 50-WP 8 to 12 lb. (For control of common purslane, barnyardgrass and redroot pigweed; 12 lb. for control of guineagrass, horse purslane, johnsongrass seedlings, sandbur and Texas panicum.)	Napropamide 4 to 6 lb.	20 to 100 gal. water	To soil surface in winter through early spring before weeds emerge.	Direct spray and avoid contact with fruit or foliage. Treatment must be followed by sprinkler or flood irrigation the same day. Use enough water to wet the soil 2 to 4 in. deep.

Table 13. Citrus (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Oranges and grapefruit	Sinbar 80-W 2 to 4 lb.	Terbacil 1.6 to 3.2 lb.	Minimum of 40 gal. water	Just before or just after annual weeds germinate.	Apply to groves established 1 or more years. NOTE: Apply as a band or broadcast treatment as a directed spray. Avoid contact of foliage and fruit with spray or mist. Do not use on coarse soils with less than 1% organic matter, or poorly-drained soils, or on trees planted in irrigation furrows. Treated areas may be planted to citrus trees 1 yr. after last application.
	Sinbar 4 to 6 lb. on sandy loam and 8 to 10 lb. on clay loam soils	Terbacil 3.2 to 8 lb.	Minimum of 40 gal. water	In early spring or early summer (for johnsongrass and bermudagrass)	Apply to groves established for 2 or more yr. See NOTE above.
Oranges and grapefruit	Hyvar X 80-WP 2 to 4 lb. for annual weeds or 4 to 8 lb. for perennial	Bromacil 1.6 to 3.2 lb. for annual weeds 3.2 to 6.4 lb. for bermudagrass,	Minimum of 40 gal. water	Preemergence for annual and for perennial weeds shortly be-	Use under trees established 4 yr. or longer. Do not use on soils with less than 1% organic matter. Do not

	weeds - bermuda-grass, johnson-grass and nutsedge (See label for rate and soil type. Partial control of these perennial weeds with a single treatment.)	johnsongrass and nutsedge		fore or after weed growth begins	apply more than 8 lb. per acre per year. Do not treat trees planted in irrigation furrows. Treated areas may be planted to citrus trees 1 yr. after application. Do not replant to other crops within 2 yr. after application.
Oranges and grapefruit	Krovar I, 80-WP (bromacil + diuron 2:2) 2 to 4 lb. on coarser soils, and 4 to 6 lb. on finer soils or soils with 2.5% organic matter or more as a single application, or alternatively, make two applications per year at rates of 2 lb. on coarser soils and 3 lb. on finer soils.	Bromacil 0.8 to 2.4 lb. + diuron 0.8 to 2.4 lb.	Minimum of 40 gal. water	Just before or just after weeds germinate and when rainfall or sprinkler irrigation is available to activate the herbicide.	Use only where trees have been established for at least 3 yr. Do not use on soils with less than 1% organic matter or on gravelly soils. Do not treat trees planted in irrigation furrows. Do not plant treated area to any crop within 2 yr. after treatment. Citrus trees may be planted 1 yr. after last application.
Oranges and grapefruit	Krovar II 80-W (bromacil + diuron 2:1) 2 to 5 lb. for annual weeds	Bromacil 1.1 to 2.7 + diuron 0.5 to 1.3 lb.	Minimum of 40 gal. water	Just before or just after weeds germinate	Use only where trees have been established at least 4 yr. NOTE: Avoid overlapping and shut off sprayer after use to avoid tree injury. Avoid contacting foliage and fruit with spray or mist. Continuous agitation of the spray mixture is necessary.

Table 13. Citrus (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
	Krovar II 80-W (bromacil + diuron 2:1) 4 to 8 lb. for perennial weeds. (See label for rate and soil type as a single application alternatively make two applications of 3 to 4 lb.)	Bromacil 2.1 to 4.2 lb. + diuron 1.1 to 2.1 lb.	Minimum of 40 gal. water	Single application from winter to early spring or two applications, one in spring and one in summer.	Partial control with single application. Repeat treatments are required. Use only where trees have been established at least 4 yr. See NOTE above.
Oranges and grapefruit	Either Princep 70-W 5 to 6 lb. or Princep 4-L 4 to 4.8 qt.	Simazine 4 to 4.8 lb.	20 to 40 gal. water	Preemergence	Do not use in nurseries. Do not apply to bedded grapefruit or oranges.
	Either Princep 80-W 4 to 5 lb., Princep 4-L 3.2 to 4 qt. + Evik 80-W 2 to 3 lb. Use 5 lb. of Princep 80-W for longer residual control. Use 3 lb. of Evik 80-W for control of heavy weed growth and top kill johnsongrass. Use higher rate of both products to control marinevine.	Simazine 3.2 to 4 lb. + ametryn 1.6 to 2.4 lb.	Minimum of 40 gal. water. Add 2 qt. of nonionic surfactant such as X-77 per 100 gals. of spray mixture.	When weeds have resumed active growth in the spring but before they exceed 4 in. in height.	Avoid contact with citrus fruit, foliage or stems. Do not use in nurseries or in groves less than 2 yr. old. Do not apply within 200 days of harvest. Do not graze treated areas.

Oranges and grapefruit	Karmex 80-W 2 to 4 lb. for annual weeds or 4 to 6 lb. for johnsongrass seedlings	Diuron 1.6 to 3.2 lb. for annual weeds or 3.2 to 4.8 lb. for johnsongrass seedlings	25 to 40 gal. water	Preemergence in spring in groves established at least 1 yr.	Remove all well-established weeds before treatment. Sprinkler or flood irrigation can be timed to activate the herbicide. Agitate spray mixture by mechanical or hydraulic means.
Orange	Either Surflan A.S. 2 to 4 qt. or Surflan 75-W	Oryzalin 2 to 4 lb.	20 to 40 gal. water	Preemergence on soil in good tilth, firm and free of clods. Do not apply to newly-transplanted fruit trees until soil has settled and there are no cracks. Do not apply more than once per season.	For nonbearing plantings, spray directly to the orchard or vineyard floor. Do not allow the spray to contact the leaves, branches or tree trunks.

Table 13. Citrus (continued).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Oranges, grapefruit and tangerines	Either Bueno 6 at 2-2/3 pt., or Super Arsonate 1 qt. For spot treatment, mix 1 qt. of Super Arsonate plus 1 to 2 qt. of a suitable surfactant in 50 gal. of water or 2-2/3 pt. of Bueno 6 in 50 gal. of water and apply to a point of runoff.	MSMA 2 lb.	100 gal. water, For Super Arsonate only. Mix 1 to 2 qt. of a suitable surfactant in the 100 gal. of water.	After weed emergence when weeds are still small, during warm weather and when conditions favor weed growth.	Use only in nonbearing groves. Apply no more than three times per year. Do not allow spray to contact foliage, stems or tree bark. Do not use near trees with crops which will be harvested within 1 yr. Do not graze livestock on treated areas.
Citrus groves	Dowpon M 2 to 4 lb. Use low rate on very light soil. Use 1 lb. in 20 gal. water and spray to wet without runoff.	Dalapon 1.5 to 3 lb.	40 to 80 gal. water. Add 0.5 to 2 pt. of an approved agricultural surfactant to 100 gal. of spray mixture, but use 4 pt. for perennial grasses.	When grasses are growing well and before heading. Apply broadcast at 2- to 10-day intervals.	Use up to three applications per season in orange, grapefruit or tangerine groves. Do not spray bare soil under the trees. Apply after rain or irrigation for best results. Direct the Dowpon M spray under trees at least 4 yr. old. Do not graze livestock on treated areas during application season.

Oranges and grapefruit	Evik 80-W 2 to 3 lb. (Use 2 lb. to control light weed infestations and 3 lb. to kill heavy weed infestations and top kill of johnsongrass.)	Ametryn 1.6 to 2.4 lb.	Minimum of 40 gal. water. Add 2 qt. of a nonionic surfactant such as DuPont WK, X-77 or LOC to 100 gal. of spray mixture.	In spring when weeds have resumed active growth, but before they exceed 4 in. in height. Do not apply within 30 days of harvest.	Make additional applications as needed not to exceed 15 lb. per acre per year. Do not use in groves established less than 2 yr. Do not allow spray to contact stems, fruit or foliage of trees. Do not graze livestock on treated areas.
Citrus	Paraquat CL 1 to 2 qt. Paraquat CL is a restricted-use herbicide.	Paraquat 0.5 to 1 lb.	50 to 200 gal. Add Ortho X-77 Spreader (nonionic) at 8 oz. per 100 gal. spray mixture.	When new growth is 1 to 6 in. high and succulent.	Retreatment may be necessary for late germinating weeds and grasses or mature weeds. Do not allow spray to contact green items, fruit or foliage. Do not allow animals to graze treated areas.
Oranges, grapefruit and tangerines	Phytar 560 1.5 to 2 gal.	Cacodylic acid 3.7 to 5 lb.	50 to 100 gal. water	After weeds and grasses emerge but before seeding stage. (Use as a directed spray in interspaces and around bases of trees.)	Use only in nonbearing groves. Spray weeds just short of runoff. Respray as required. Do not exceed three applications per year. Do not allow spray to contact leaves, stems or bark. Do not apply around trees from which fruit will be harvested within 1 yr.

Table 13. Citrus (concluded).

Crop	Product and product rate per acre broadcast	Herbicide common name, rate per acre active ingredient broadcast	Spray volume per acre broadcast	Time to apply	Remarks
Oranges, grapefruit and tangerines	Roundup 1 qt. to weeds less than 6 in. tall, but 1.5 qt. to weeds over 6 in. tall	Glyphosate 0.75 to 1.1 lb.	20 to 60 gal. water	To actively growing grasses and broadleaf weeds. Use for site preparation before transplanting or in established groves. Allow a minimum of 14 days between last application and harvest.	The combined total of all treatments must not exceed 10.6 qt. per acre per year. Avoid spray contact to foliage or bark on trees established for less than 2 yr. See table 10 "Specific Perennial Weeds with Roundup."

COMMON CHEMICAL AND PRODUCT NAMES OF HERBICIDES

The herbicides recommend in this section have been identified by the accepted Weed Science Society of America common name, the correct chemical name as required on the label and where practiced, one or more product names.

Product names are not included as an endorsement of the product of a specific manufacturer, nor is there any implication that any other formulation containing the same active chemical is not equally as effective. Product names are included solely to aid readers in locating and identifying recommended herbicides.

Table 14. Common, chemical, product name and manufacturer of herbicides.

Groups of related herbicides and common name	Chemical name	Product name and amount of active ingredient or acid equivalent and manufacturer
AMIDES		
Bensulide	O,O-diisopropyl phosphorodithioate S-ester with N-(2 mercaptoethyl) benzenesulfonamide	Prefar 4-E, 4 lb./gal. Stauffer Chemcial Company
Napropamide	2-(a-naphthoxy)-N,N-diethyl-propionamide	Devrinol 50-WP Stauffer Chemical Company
Pronamide	3,5-dichloro-N-(1,1-dimethyl-2-propyml)-benzamide	Kerb 50-W, Rohm and Haas Company
BENZOIC ACIDS		
Chloramben	3-amino-2,5-dichlorobenzoic acid	Amiben 2 lb./gal., Union Carbide
DINITROANALINES		
Oryzalin	3,5-dinitro-N^4,N^4-dipropyl-sulfanilamide	Surflan 75-W, or Surflan AS, 4 lb./gal., Elanco
Trifluralin	a,a,a,trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine	Treflan EC 4 lb./gal. or Treflan 5-G, Elanco
Benefin	N-butyl-N-ethyl-a,a,a, trifluoro-2,6-dinitro-p-toluidine	Balan LC 1.5 lb./gal.
ORGANIC ARSENICALS		
Cacodylic acid	hydroxydimethylarsine oxide	Phytar 560, 2.48 lb./ gal., Crystal Chemical Company
MSMA	monosodium methanearsonate	Bueno 6, 6 lb./gal., or Super Arsonate 8 lb./ gal., Diamond Shamrock

Table 14. Common, chemical, product name and manufacturer of herbicides (concluded).

Groups of related herbicides and common name	Chemical name	Product name and amount of active ingredient or acid equivalent and manufacturer
TRIAZINES		
Ametryn	2-(ethylamino)-4-(isopropylamino)-6-(methylthio)-s-triazine	Evik 80-W, Ciba-Geigy
Metribuzin	4-amino-6-tert-butyl-3-(methylthio)-as-triazin-5-(4-H)one	Lexone 50%, 4-L or DF, DuPont
Simazine	2-chloro-4,6-bis(ethylamino)-s-triazine	Princep 80-W, Ciba-Geigy
URACILS		
Bromacil	5-bromo-3-sec-butyl-6-methyluracil	Hyvar X 80%, DuPont, In Krovar I 40%, and Krovar II 53%, DuPont
Terbacil	3-tert-butyl-5-chloro-6-methyl-uracil	Sinbar 80%, DuPont
UREAS		
Diuron	3-(3,4-dichlorophenyl)-1,1-dimethylurea	Karmex 80%, DuPont
Chloroxuron	3-[p-(p-chlorophenoxy)phenyl] -1,1-dimethylurea	Norex 50-WP, Nor-Am
Cycloate	S-ethyl-N-ethylthiocyclohexane-carbamate	Ro-Neet 6-E, 6 lb./gal., Stauffer Chemical
EPTC	S-ethyl-dipropylthiocarbamate	Eptam 7-E, 7 lb./gal., Eradicane 6.7 lb./gal., Stauffer Chemicals
MISCELLANEOUS HERBICIDES		
Dalapon	2,2-dichloropropionic acid	Dowpon M 75%, Dow Chemical Company
DCPA	dimethyl, tetrachloroterephthalate	Dacthal W-75, Diamond Shamrock Corporation
Dichlobenil	2,6-dichlorobenzonitrile	Casaron 50%, or G-4 Thompson Hayward Chemical Company
Glyphosate	N-(phosphonomethyl) glycine	Roundup 3 lb./gal., Monsanto
Naptalam	N-1-naphthylphthalamic acid	Alanap L, 2 lb./gal., Uniroyal Chemical
Paraquat	1,1-dimethyl-4,4'-bipyridinium ion	Paraquat CL, 2 lb./gal. Chevron - Ortho

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